

1    **CLAIMS**

2    What is claimed is:

3    1.    A computer-implemented method for switching between multiple  
4    implementations of a routine in a library of routines that are linked with an application  
5    program that is hosted by a computer system, comprising:6                compiling a plurality of implementations of a routine into respective object code  
7    modules, the routine having an associated name and each implementation adapted to a  
8    selected hardware configuration;9                associating the object code modules with the name of the routine and respective  
10   sets of hardware characteristics; and11                resolving when the application program is loaded into memory of the computer  
12   system, a reference to the routine using the sets of hardware characteristics and a  
13   hardware configuration of the system.

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15    2.    The method of claim 1, further comprising establishing a symbol table having a  
16   plurality of entries, each entry including a name of a routine and a reference to an  
17   object code module in the library.

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19    3.    The method of claim 2, further comprising, for the routine having a plurality of  
20   implementations, adding a plurality of entries to the symbol table and associating  
21   respective sets of hardware characteristics with the plurality of entries.

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23    4.    The method of claim 3, wherein the hardware characteristics include at least one  
24   of clock speed of the processor, processor model, cache configuration of the system,  
25   hardware operation latency times, instruction set characteristics, bypass characteristics,  
26   branch prediction behavior, pre-fetching capability, information describing stall  
27   conditions, branch penalties, size and associativity of processor data structures, queue  
28   sizes for out-of-order or decoupled processors, and the number of processors in a multi-  
29   processor system.

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31    5.    The method of claim 4, wherein the resolving step further comprises obtaining  
32   the hardware configuration of the system from at least one of a system configuration  
33   data file, one or more system identification registers, and system firmware.

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1 6. The method of claim 3, wherein the resolving step further comprises obtaining  
2 the hardware configuration of the system from at least one of a system configuration  
3 data file, one or more system identification registers, and system firmware.

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5 7. The method of claim 1, wherein the hardware characteristics include at least one  
6 of clock speed of the processor, processor model, cache configuration of the system,  
7 hardware operation latency times, and instruction set characteristics.

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9 8. The method of claim 1, wherein the resolving step further comprises obtaining  
10 the hardware configuration of the system from at least one of a system configuration  
11 data file, one or more system identification registers, and system firmware.

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13 9. A computer-implemented method for switching between multiple  
14 implementations of a routine in a library of routines that are linked with an application  
15 program hosted by a computer system, comprising:

16 establishing a set of hardware configuration characteristics that describe the  
17 computer system;

18 establishing a symbol table, the symbol table having one or more entries that  
19 include a name of a routine, a set of hardware characteristics, and an address  
20 referencing a routine in the library;

21 obtaining a name of a routine having multiple implementations when the library  
22 is loaded with the application program into memory of the computer system;

23 matching the name of the routine and the set of hardware configuration  
24 characteristics that describe the computer system to an entry in the symbol table; and

25 generating an address in executable code for references to the routine having  
26 multiple implementations when the library is loaded with the application program, the  
27 address referencing an implementation in the library as identified in the matching step  
28 by the entry in the symbol table.

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30 10. The method of claim 9, wherein the hardware configuration characteristics  
31 include at least one of clock speed of the processor, processor model, cache  
32 configuration of the system, hardware operation latency times, and instruction set  
33 characteristics.

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1 11. The method of claim 10, wherein the resolving step further comprises obtaining  
2 the hardware configuration of the system from at least one of a system configuration  
3 data file, one or more system identification registers, and system firmware.

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5 12. The method of claim 9, wherein the resolving step further comprises obtaining  
6 the hardware configuration of the system from at least one of a system configuration  
7 data file, one or more system identification registers, and system firmware.

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9 13. An apparatus for switching between multiple implementations of a routine in a  
10 library of routines that are linked with an application program that is hosted by a  
11 computer system, comprising:

12       means for compiling a plurality of implementations of a routine into respective  
13 object code modules, the routine having an associated name and each implementation  
14 adapted to a selected hardware configuration;

15       means for associating the object code modules with the name of the routine and  
16 respective sets of hardware characteristics; and

17       means for resolving when the application program is loaded into memory of the  
18 computer system, a reference to the routine using the sets of hardware characteristics  
19 and a hardware configuration of the system.

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21 14. A computer-implemented symbol table for referencing a library of object code  
22 modules that implement a plurality of routines, comprising:

23       a first set of one or more entries, each entry in the first set including a unique  
24 name of a routine and a reference to an object code module in the library; and

25       a second set of one or more entries, each entry in the second set including a  
26 shared name of a routine, a set of hardware characteristics, and a reference to an object  
27 code module in the library.

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29 15. The symbol table of claim 14, wherein the hardware characteristics include at  
30 least one of clock speed of a processor, processor model, cache configuration, hardware  
31 operation latency times, instruction set characteristics, bypass characteristics, branch  
32 prediction behavior, pre-fetching capability, information describing stall conditions,  
33 branch penalties, size and associativity of processor data structures, queue sizes for out-

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1 of-order or decoupled processors, and the number of processors in a multi-processor  
2 system.

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4 16. A computer program product configured for causing a computer to perform the  
5 steps of:

6 compiling a plurality of implementations of a routine into respective object code  
7 modules, the routine having an associated name and each implementation adapted to a  
8 selected hardware configuration;

9 associating the object code modules with the name of the routine and respective  
10 sets of hardware characteristics; and

11 resolving when the application program is loaded into memory of the computer  
12 system, a reference to the routine using the sets of hardware characteristics and a  
13 hardware configuration of the system.

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